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ENZOOTIC ABORTION IN EWES

I. Transmission of the Disease

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Abortion and premature lambing occur in many flocks on tick-free hill pastures and arable farms in the south-east of Scotland. Abortions also occur on tick infested pastures and may sometimes be the consequence of tick transmitted disease. The information given in this paper has been obtained from investigations made on flocks free from tick infestation. Numerous aborted foetuses and premature lambs from these flocks have been examined culturally for evidence of a bacterial infection but none has been found and no micro-organism has been recognised in smears made from foetal stomach and intestinal contents, nor have inclusion bodies been found on histological examination of foetal organs.

Field Evidence

In flocks in which the disease has recurred for several years the incidence of abortion is usually reported to be approximately 5 per cent. but occasionally and particularly among first and second lamb ewes the incidence may be four or five times higher. When the disease appears in a hitherto clean flock the incidence may be high for two or three years, up to 25 per cent. or even 30 per cent. of ewes of all ages aborting or lambing prematurely.

There is general agreement among owners who have kept records that ewes having once aborted or lambed prematurely, lamb normally at subsequent pregnancies.

It is often impossible to find a plausible explanation for the first appearance of the disease in a flock, but at other times it is reported as following on the introduction of bought in non-pregnant ewes or even gimmers (virgin ewes).

Abortion and premature lambing, the only striking clinical signs, generally take place late in pregnancy, most frequently during the last two or three weeks of the normal gestation period, but some abortions may occur even six weeks before full term. Premature lambs may be weak and die. In multiple pregnancies one foetus may be dead, while one or more live lambs may be born showing various degrees of strength and vigour, and from the appearance of the dead foetus it may be obvious that death occurred some days or weeks before the gestation ended.

Ewes that abort lambs which appear to have been dead *in utero* for some weeks are generally in poor condition, and it is not uncommon for such animals to die within a few days of aborting. When the lambs have died shortly before parturition or are born alive before or at full term, there is generally less disturbance in the ewe's health, and the ewes may appear normal. Retention of the foetal membranes, however, may occur, resulting, in some cases, in a loss of condition and even in death. Farmers agree that with rare exceptions ewes that have aborted or lambed prematurely conceive without difficulty, and that sterility is not a sequel to the disease.

The epidemiology indicates that the disease is caused by an infection and that ewes that have passed through the phase of aborting or lambing prematurely have acquired the ability to carry their lambs to full term.

Experimental

In the spring and summer of 1949 an experiment was carried out from which it was hoped that information on the aetiology of the disease would be obtained.

From February 9th to March 10th 38 aborted foetuses and premature dead lambs were received from outbreaks of abortion in East Lothian and Berwickshire. The spleen, kidneys, liver, lungs and stomach contents of each foetus or lamb were cultivated for bacteria but apart from an occasional obviously contaminating bacterium the organs and stomach contents were bacteriologically sterile.

Portions of these organs and stomach contents were stored at —70° C. At the end of February bacteriologically sterile materials from nine foetuses belonging to four flocks and consisting of 35 grams of spleen, 115 grams of kidney, 320 grams of liver, 173 grams of lung tissue and 160 grams of stomach contents were mixed and ground to a smooth paste in a "Premier Paste Mill." A 20 per cent. suspension of the paste was made in saline serum broth (10 per cent. horse serum). A part of the suspension was centrifuged in an angle centrifuge at low speed for ten minutes to deposit coarse particles, and the remainder, after more prolonged centrifuging at higher speed, was filtered through kieselguhr and finally through a 0·4 μ gradacol membrane. The suspension and filtrate were inoculated into pregnant ewes on March 1st.

Later another suspension and filtrate were prepared in the same way from materials collected from 12 foetuses belonging to seven flocks. This suspension and filtrate were inoculated into pregnant ewes on March 15th. On both March 1st and 15th control ewes were injected with saline serum broth. The experimental ewes were all young sheep (gimmers), from an area believed to be free from abortion, and they ran with the tups from the middle of December to the end of January. A plan of the experiment is shown in Table I.

TABLE I

Plan of Infection Experiment

Each ewe received 5 c.c. intravenously and 5 c.c. subcutaneously.

Material	*Date*	*No. of Ewes*
Suspension	1.3.49	28
Filtrate	,,	28
Saline Serum Broth (Control)	,,	27
Suspension	15.3.49	27
Filtrate	,,	27
Saline Serum Broth (Control)	,,	27

A record of the service dates was kept, and on March 1st the ewes were apportioned to the above groups, a similar number of ewes at approximately the same stage of gestation being placed in each group.

All the ewes were run together as a flock throughout the experiment. From the beginning of April they were kept under observation during daylight so that, should any abortions occur, the dead lambs and membranes might be collected for examination. Abortions commenced on April 21st and continued until near the end of the lambing season. In the earlier abortions the foetuses were obviously premature ; later, premature live lambs were born that died despite careful nursing. The abortions and premature lambings were confined to those ewes inoculated with the unfiltered suspensions. As lambing proceeded an effort was made to collect and examine the foetal membranes from all the ewes, the membrane in some cases being removed manually. The results of the experiment are recorded in Table II.

TABLE II

Showing the results of the inoculation of suspensions Batch 1 and Batch 2

	28 *Ewes Inoculated* 1.3.49	27 *Ewes Inoculated* 15.3.49
Aborted, infected foetal membranes ...	10	18
Premature (born alive but died) infected foetal membranes	2	2
Normal birth (lambs lived), infected foetal membranes	1	1
Normal birth, no infection of foetal membranes	2	0
Normal birth, no foetal membranes examined	7	1
Barren	4	2
Slaughtered before lambing, infected foetal membranes	2	2
Slaughtered before lambing, non-infected foetal membranes	0	1
	28	27

None of the foetal membranes from the ewes inoculated with filtrates or from the control ewes injected with saline serum broth were infected, and none of the ewes aborted or lambed prematurely.

The aborted foetuses from experimental ewes showed abnormalities similar to those encountered in field cases, namely varying degrees of blood-tinged oedema in the subcutaneous and intramuscular tissues and blood tinged transudates in the large serous cavities. The foetal membranes of aborted foetuses, of most premature lambs and of one apparently normal full term lamb showed gross abnormalities which varied in degree and extent from case to case and which consisted in necrosis of the cotyledons and chorion and accumulations of a reddish to a dirty pink coloured discharge. The affected cotyledons had lost the dark purplish colour of normal tissue and ranged from a dark red to a dull clay colour. They had a matted appearance and a more solid consistency than normal. The exudate mentioned above tended to accumulate round and to adhere to the interstices of the cotyledons. The chorion presented irregular areas of thickening which ranged from an oedematous to a dry leather-like thickening of the tissues (Fig. 1). The extent of the thickened areas varied greatly: in some membranes almost the whole chorion was involved, whereas in others a small area only was affected. Diseased areas frequently had a mottled appearance on account of variation in the thickness and the colour of the affected parts. The gross appearance of the membranes was similar to that of bovine foetal membranes infected with *Brucella abortus*. In contrast to the foetal membranes the uterus was apparently normal, the uterine mucosa and cotyledons showing no evidence of an inflammatory reaction.

Smears made from the diseased cotyledons and chorion and from the exudate were stained with dilute Ziehl-Neelsen carbol fuchsin (1 : 10) for ten minutes ; they were then differentiated very rapidly with dilute acetic acid and lightly counterstained with dilute methylene blue. Very large numbers of small red-stained micro-organisms were present in these smears, occurring singly and in clusters. Some of the more closely packed clusters were intracellular. These minute organisms were coccal in shape and unless present in clusters were easily overlooked (Fig. 2). They stained by Macchiavello and Castaneda stains for rickettsiae and also by Giemsa stain. For the routine examination of smears the modified Ziehl-Neelsen stain was the most satisfactory, and when smears stained by this method were examined by dark field illumination the organisms showed as bright pale green round bodies (Fig. 3). These bodies will from now on be referred to as elementary bodies.

The normal chorion of the sheep consists of a thin layer of connective tissue covered by a single layer of epithelial cells which are in intimate contact with the uterine mucosa in the intercotyledonary areas of the uterus. This layer of epithelial cells is continuous with the epithelium covering the villi of the foetal cotyledons and in the sheep remains present throughout gestation. The epithelium of the uterine mucosa, on the other hand, is not continuous over the villi of the maternal cotyledon, which consists only of tufts of blood vessels set in a slight connective tissue matrix. The essential pathological changes found consisted of a subacute inflammatory thickening of the subepithelial tissues of the chorion with considerable round cell infiltration and with some necrosis of the lining epithelium (Fig. 4 and 5). The foetal cotyledons showed varying degrees of abnormality. Some cotyledons were greatly necrosed, the epithelium, connective tissue core and vessels being completely destroyed and replaced by inflammatory exudate (Fig. 6, 8 and 9) while other cotyledons were only partially destroyed (Fig. 5). The uterine mucosa apart from a very slight round cell infiltration was normal while the maternal cotyledon generally showed only slight superficial necrosis and very little infiltration or exudation (Fig. 7.) The location of the elementary bodies was best seen in sections stained by Giemsa. In the areas of necrosis considerable numbers of elementary bodies, single and in small groups, were seen, but there was little doubt that the characteristic habitat of the organism was in the cells of the epithelium of the chorion and foetal cotyledon. These cells either

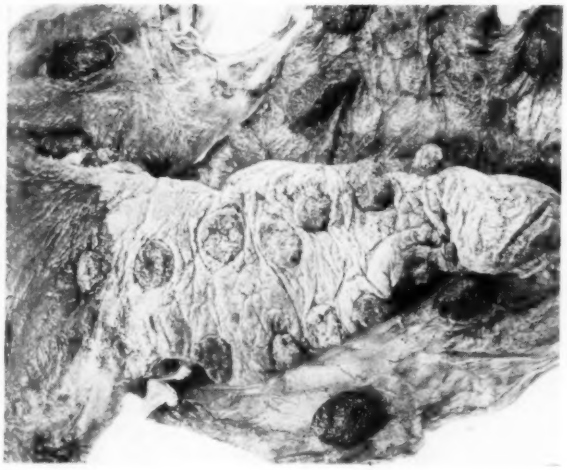

FIG. 1.
Foetal membrane of aborted foetus showing an area of thickened chorion and necrotic cotyledons contrasted with the appearance of a more normal area behind.

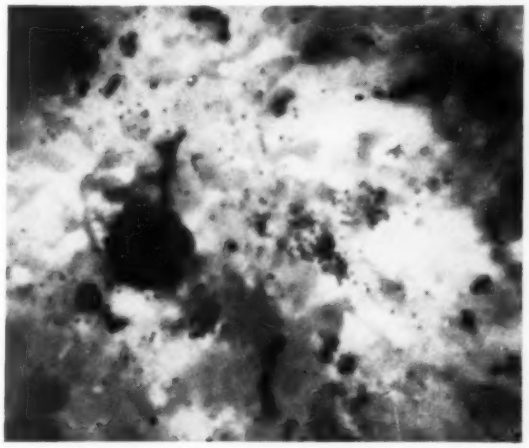

FIG. 2.
Smear made from a diseased foetal cotyledon showing small coccal shaped elementary bodies both singly and in groups. Stain modified Ziehl Neelson. X1500.

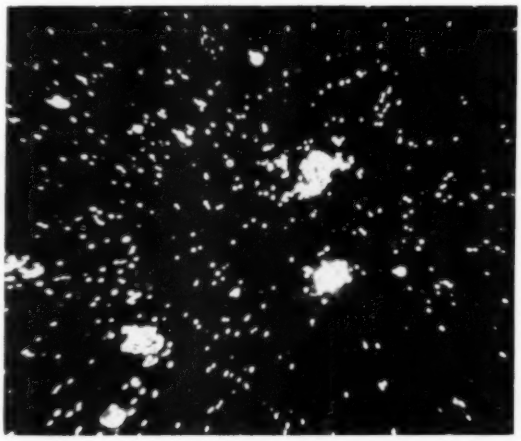

FIG. 3.
Same smear as in Fig. 2. Dark field illumination. X1000.

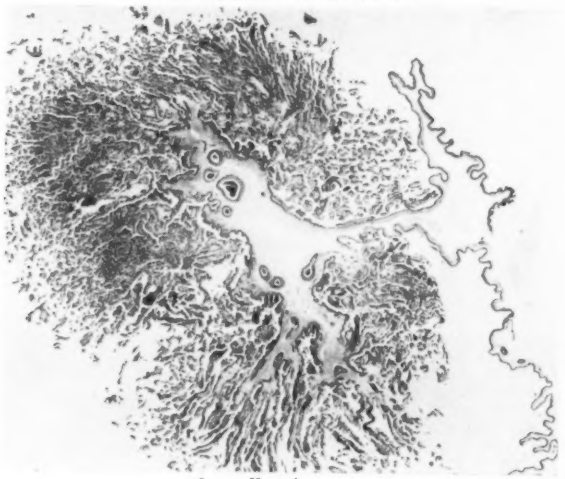

FIG. 4.
Normal foetal cotyledon and chorion showing breakdown but no necrosis. Haematoxylin and Eosin. X5.

FIG. 5.
Infected foetal cotyledon showing areas of necrosis and chorion thickened with inflammatory granulation tissue. Haematoxylin and Eosin. X5.

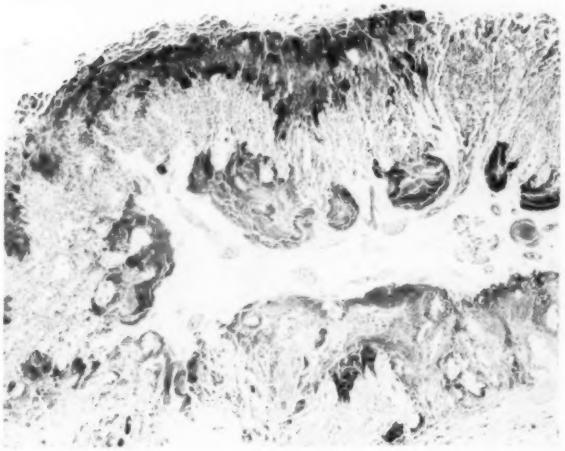

FIG. 6.
Infected foetal cotyledon showing large areas of necrosis. Haematoxylin and Eosin. X5.

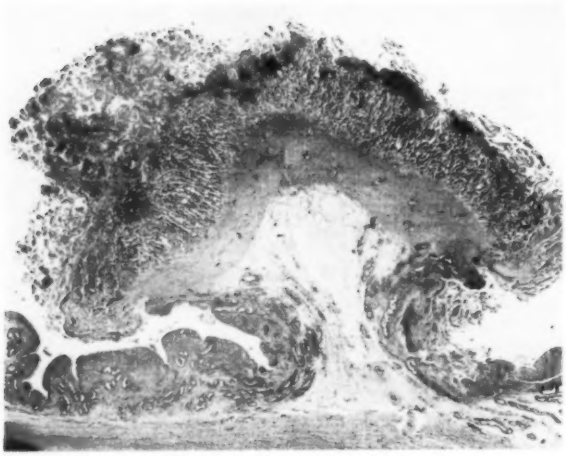

FIG. 7.
Maternal cotyledon showing slight superficial necrosis with some necrotic foetal cotyledon still attached. Haematoxylin and Eosin. X5.

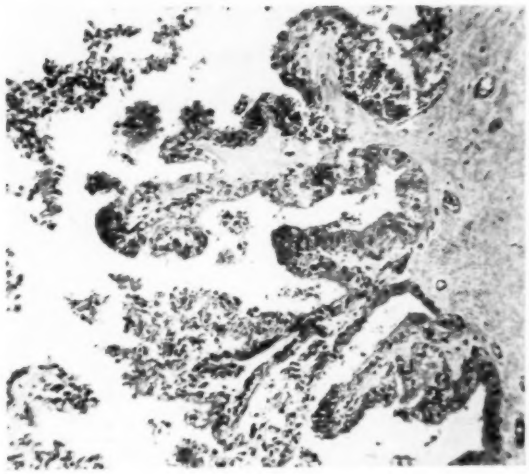

FIG. 8.
Normal foetal cotyledon showing villi and lining epithelial cells. Haematoxylin and Eosin. X100.

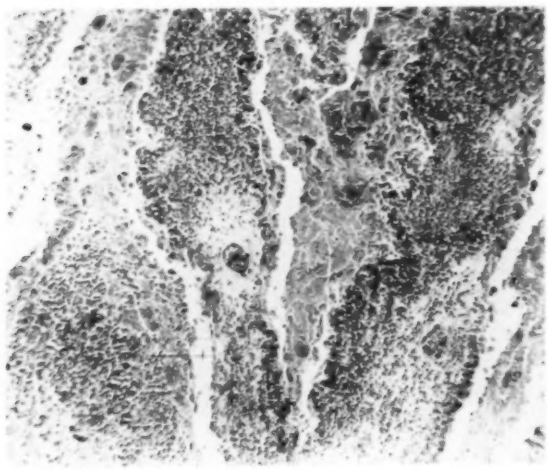

FIG. 9.
Necrosis of villi of foetal cotyledon. Haematoxylin and Eosin. X100.

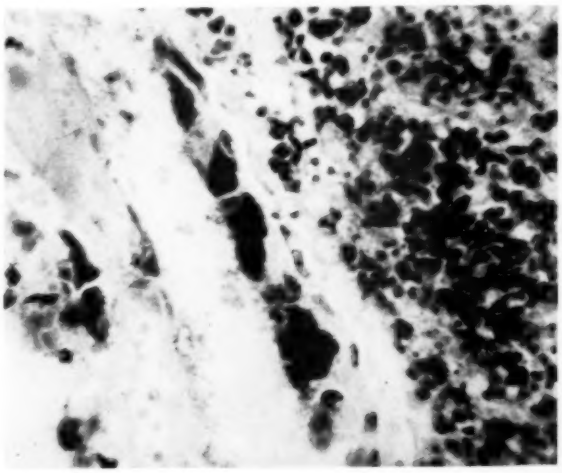

FIG. 10.
Lining epithelial cells of the villi of an infected foetal cotyledon packed with elementary bodies. The normal connective tissue is infiltrated with inflammatory cells. Giemsa. X600.

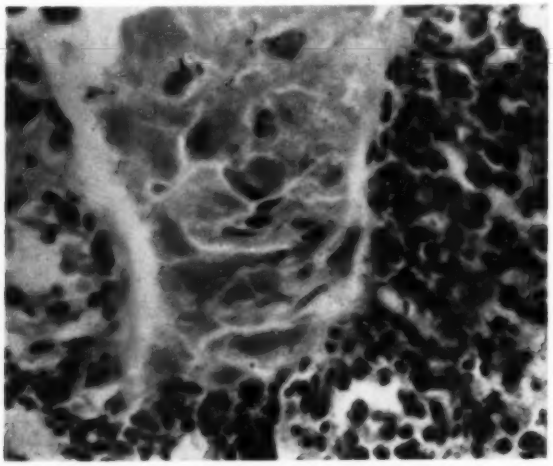

FIG. 11.
Group of desquamated necrosed epithelial cells, the cytoplasm of the cells being packed with elementary bodies. Haematoxylin and Eosin. X800.

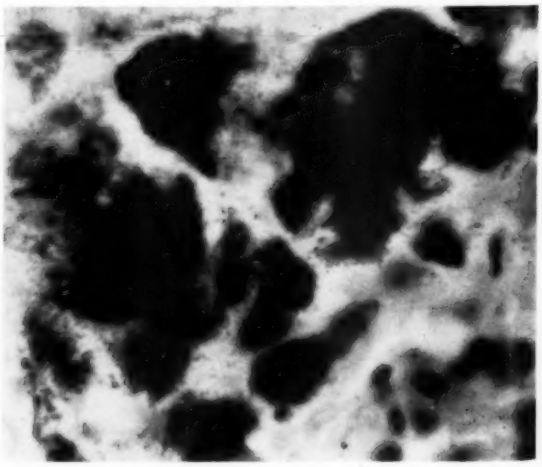

FIG. 12.
Same field as in Fig. 12 showing packing of cells with elementary bodies. Giemsa. X1500.

singly or more commonly in groups, were densely packed with the elementary bodies. The cells varied considerably in appearance and situation. Some were greatly enlarged and the nucleus was pushed to one side while others were obviously degenerating and becoming broken. In an occasional cell the centre of a dense mass of elementary bodies was vacuolated. Some cells were still in continuity with the rest of the epithelium (Fig. 10) while others were detached but still in groups (Fig. 11 and 12) and yet others were found scattered here and there amidst large areas of necrosis. The epithelial cells of the uterine mucosa were only occasionally parasitised and never necrosed and desquamated. The uterine cotyledon being free of epithelium was free of elementary bodies except where the necrotic foetal cotyledon was still attached.

No bacteria were cultivated from the internal organs of the aborted foetuses and smears prepared from foetal stomach contents showed no micro-organisms.

It was apparent that necrosis of the foetal membranes had been produced by the inoculation of the suspension of foetal material obtained from the field outbreaks of abortion and that the lesions in the membranes were constantly associated with a heavy infection of elementary bodies.

A supply of elementary bodies, free from contaminating bacteria, was obtained from the uteri of pregnant infected ewes slaughtered before the uterine seal had broken. The elementary bodies were readily cultivated on inoculation into the yolk sac of a six or seven day chick embryo. The embryos died on the fourth to ninth day after inoculation when large numbers of elementary bodies were found in the yolk sac. Passage from yolk sac to yolk sac presented no difficulty but no enhancement of pathogenicity for the embryo has been observed. Infective materials stored at temperatures of —20° C. and —70° C. have remained viable for several months.

The stomach contents of aborted foetuses, and suspensions of tissues from lungs,.liver, spleen and kidney of the foetuses have not been found infective for chick embryos. Colostrum from infected ewes and suspensions of the internal iliac lymph glands of infected ewes slaughtered before aborting or lambing have not been found infective for the chick embryo.

Broth dilutions of bacteriologically sterile foetal fluid containing large numbers of elementary bodies were prepared. The undiluted fluid and fluid diluted 10^{-1}, 10^{-2} and 10^{-3} were respectively inoculated subcutaneously in 1 c.c. quantities into each of four sheep. The one sheep inoculated with the 10^{-3} dilution remained normal; the other three sheep all showed a rise in temperature three days after inoculation; the temperatures returned to normal by the eighth day. The maximum temperatures ranged from 106·4 to 107° F.

An infected yolk sac was emulsified and suspended in 10 c.c. of broth. Two sheep were each inoculated intravenously with 3 c.c., two were inoculated subcutaneously with 1 c.c. and two were inoculated intradermally with 0·1 c.c. The following day all the sheep showed a rise in temperature; the temperature remained high for three days and then returned to normal. The maximum temperatures shown by individual sheep varied from 106·4° to 108° F. Two weeks after the first inoculations had been given the sheep were each reinoculated as before but with double the previous dose. On the following day each sheep showed a rise in temperature of from 2° to 4° F. By the the second or third day the temperature had returned to normal. Apart from the thermal reactions and some loss of appetite when the temperature was high all the sheep remained in normal health. Control sheep injected with suspensions of normal yolk sac showed no rise in temperature.

A suspension of infected yolk sac dropped into the conjunctival sac of sheep and inoculated into the prepuce of sheep caused neither a local nor a systematic reaction.

Rabbits and guinea pigs inoculated subcutaneously and intraperitoneally with suspensions of infective yolk sacs showed, on the first and second days after inoculation, a rise in temperature of 1° to 2° F., but four days after inoculation their temperature had returned to normal and remained normal until recording stopped three weeks later.

Male guinea-pigs inoculated subcutaneously and intraperitoneally with in some cases infective material from ovine foetal membranes and in others with infective yolk material, were killed and examined at varying intervals after inoculation. No abnormalities were found and impression smears made from the surface of the visceral peritoneum and the peritoneum of the scrotal sac never showed elementary bodies.

Pregnant guinea-pigs inoculated subcutaneously and intraperitoneally with infective material and killed before gestation ended sometimes showed elementary bodies, in very variable numbers, in the placenta.

The intracerebral inoculation of guinea-pigs with infective material produced no results.

Mice and rats inoculated by the subcutaneous, intraperitoneal and intracerebral routes remained well. Infection has not been observed in mice inoculated while pregnant.

One cow in the sixth month of gestation was inoculated intravenously with a suspension of ovine infected foetal membranes. Ten weeks after inoculation the cow aborted. The foetal membranes were recovered two to three hours later and were grossly diseased. The macroscopic lesions were indistinguishable from those caused by a *Br. abortus* infection, and histologically the membranes showed necrosis of the cotyledons and chorion, elementary bodies being present in the epithelial cells. Smears prepared from the foetal membranes showed elementary bodies singly and in clusters but less abundant than in the necrotic foetal membranes from sheep. The foetus was examined culturally but no bacterium was isolated. Smears made from the foetal stomach contents showed no elementary bodies.

Mice inoculated intranasally with heavily infected suspensions of yolk sac died five to seven days later. Their lungs showed areas of pneumonia containing numerous elementary bodies. The infection was transmitted in series from mouse to mouse.

Rats inoculated intranasally did not develop an infection; and the elementary bodies were not propagated in the lungs of calves and sheep inoculated intratracheally with infective material.

Discussion

Necrosis of the foetal membranes of sheep together with abortion and premature lambing has been produced by the inoculation of pregnant ewes with material from aborted lambs from flocks where outbreaks of abortion were occurring. The constant presence of large numbers of elementary bodies in the foetal membranes and discharges in the experimentally produced disease suggests that they are the causal microbe-organisms or the visible stage of a virus responsible for the disease. In their morphology and staining reactions the elementary bodies resemble the rickettsiae and the elementary bodies of the psittacosis-lymphogranuloma group of infective agents. Knowledge of the manner of transmission of the disease in the field might assist in the

classification of the infective agent. At present we do not have this knowledge; all that can be stated is that ticks, the vectors of some rickettsial diseases, are not implicated.

The failure to find the elementary bodies in the body of the foetus was surprising. In the bacterial infections that cause abortion the causal organisms multiply in the stomach contents where they are found in great numbers. Presumably the elementary bodies are obligate tissue parasites and failure to multiply in the stomach contents might account for the inability to recognise them in smears. The failure to infect the chick yolk sacs by the inoculation of stomach contents or of tissues from the internal organs of aborted foetuses suggests either that the elementary bodies were present in very small numbers and therefore incapable of setting up infection in the yolk sac, or that the elementary bodies had been destroyed in the stomach contents and possibly in the foetal tissues.

The elementary bodies or their precursors must have been present in the infective material used for the inoculation of the experimental sheep. Whether they were present in the stomach contents or in the foetal tissues or in both is a matter of conjecture. Another source is possible, however, namely contamination from the lambs' fleece wet with infected foetal fluids. Most of the lambs were examined without preliminary immersion in or wetting with disinfectant and attempts to avoid contamination when opening the peritoneal and thoracic cavities by the repeated sterilisation of instruments in boiling water, may not have been successful. We were probably fortunate in reproducing the disease with the type of material used. Obviously the materials most certain to transmit infection are suspensions of diseased foetal membranes and infected foetal discharges or fluids.

The foetal membranes of the sheep are vulnerable to attack by the elementary bodies or the infective agent, as also are the foetal membranes of the cow, and the placenta of the guinea-pig is to some extent susceptible. The somatic tissues of the ovine and bovine foetuses appear to be immune to attack, and, with the exception of mouse lung, the somatic tissues of all animals exposed to infection have been found to be resistant. The thermal response evoked by the inoculation of material containing elementary bodies may arise from the disposal of these bodies, or of a toxin associated with them, by the tissues, and not from any reaction to the invasion of host cells by the elementary bodies.

Whether most of the outbreaks of abortion and premature lambing in the south-east of Scotland are attributable to the same type of infection that caused disease in the experimental sheep is not known and the answer to this question must await further investigation.

Greig (1936) described an enzootic abortion of sheep in the Border counties of Roxburgh, Selkirk and Berwick and in other countries in Scotland. The information gathered by us on abortion in flocks in the south-east of Scotland, while different in some respects from that given by Greig, no doubt concerns the same disease or group of diseases. The only important discrepancy in the two descriptions occurs over the future behaviour of sheep that have aborted. According to Greig the same sheep may abort repeatedly whereas our information shows that after abortion they may be expected to lamb normally. Repeated abortion would suggest that the disease is not caused by an infective agent and this was the opinion held by Greig who though suspecting a dietary deficiency was unable to obtain experimental evidence that a deficiency was at play. An acquired resistance to abortion would suggest on the other hand, an acquired resistance to an infective agent.

The wide distribution of the disease reported by Greig shows the necessity of extending investigations in Scotland beyond the south-eastern areas.

Summary

A disease of the foetal membranes of the lamb caused by infection with an agent which in its morphology and in its staining reactions resembles the rickettsiae and the psittacosis-lymphogranuloma group of infective agents is described.

Ewes with infected foetuses may abort, give birth to premature weak lambs, or to apparently normal lambs. The abortions usually occur late in gestation.

The disease is probably widespread in sheep flocks in the south-east and other areas of Scotland. Definite information regarding the extent and the distribution of the disease must await further investigation. The disease occurs in flocks on tick free pastures.

The disease can be diagnosed by demonstrating the infective agent, elementary bodies, infected foetal membranes and discharges.

Experiments on the pathogenicity of the infective agent are described.

Acknowledgment.—We are indebted to and thank Dr. D. R. Wilson who kindly prepared the filtrates used in these experiments.

Reference

Greig, J. R. (1936.) *Vet. Rec.* **48.** 1225.

Erratum.—In caption below heading Fig. 12, *for* Fig. 12 *read* Fig. 11. We regret that early printing of plate precluded alteration.

BRITISH ASSOCIATION PROGRAMME

The British Association for the Advancement of Science will hold its 112th annual meeting at Birmingham from August 30th to September 6th.

The preliminary programme, published last week, shows that, as was anticipated, prominence would be given to the topic "Energy in the Service of Man" suggested by Unesco for world-wide discussion and study in 1950.

Sir Harold Hartley, F.R.S., will deliver his presidential address on "Man's Use of Energy" at the inaugural meeting in the Town Hall on Wednesday evening, August 30th; on the following days, excepting the week-end, the 13 sectional presidents' addresses will be heard, together with discussions by authorities about scientific thought and experiment. Three evening discourses, which are always popular features of the annual meeting, will be given: Professor K. von Frisch will speak on "The Language of the Bees" on September 1st; two days later Dr. Barnes, F.R.S., Bishop of Birmingham, will speak about "Science, Religion and Moral Judgments," and on September 4th Dr. A. C. B. Lovell, of the Jodrell Bank (Cheshire) Experimental Station, will explain the new science of radio astronomy.

The Association will be honoured by an address from Dr. J. B. Conant, President of Harvard University and a former President of the American Association for the Advancement of Science, who will speak on "An Experiment in the Study of Science by Non-Scientists."

For the first time in the Association's long history there will be an exhibition in connection with the meeting; it will illustrate this year's theme—"Man and Energy"—and is being arranged by the National Coal Board, the British Gas Council, the British Electricity Authority, and the Birmingham Municipal Museum. Another novel feature of the 1950 meeting will be the award by the I.C.I. of *Endeavour* prizes to the value of 85 guineas for scientific essays. The Association is also offering a prize of £10 for the best essay by an "exhibitioner" (guest member) on any aspect of the annual meeting.

SOME REMARKS ON MASTITIS IN THE BOVINE SUBJECT, WITH PARTICULAR REFERENCE TO ACUTE INTERSTITIAL MASTITIS DUE TO STRAINS OF *STAPHYLOCOCCUS AUREUS*

BY

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An acute staphylococcal mastitis syndrome similar to that outlined by Begg (H) and White (W. A.) in *The Veterinary Record* of February 25th, 1950, must be all too familiar to practitioners in most parts of Britain—though in the present writer's hands the multiple local injections of penicillin they advocate have not proved a dependable treatment.

In this district the disease is usually found to be associated with coagulase-producing strains of *Staphylococcus aureus*, which enter the connective tissue of the udder through an often extremely small wound or abrasion in the *skin*, or much less commonly from a fibrosed focus of infection within the gland, and may under suitable conditions set up an acute or per-acute mastitis which commences as a cellulitis within the udder wall and might properly, it is suggested, be described as an acute *interstitial* mastitis.

Occasionally on particular farms, in the presence of suitable trauma, Clostridia have also been incriminated from the outset.

It seems evident that certain forms of management predispose to the condition; and possible that in the Clostridial cases incidence may be related to particular soils—notably in this area a medium to light and very fertile red loam.

The disease occurs most commonly in good milkers within a few days before or after calving, and appears very frequently in animals which have been "steamed-up" to excess at a late stage in pregnancy, after a previously insufficient diet. It may occur, however, in any female, though it seems probable that a pre-requisite is a lowering of both local and general resistance, with consequent failure to put up the normal response to staphylococcal infections, which is of course to confine the original focus within the walls of an abscess.

Clinical support for this latter view is afforded by the successful use of toxoid on a number of occasions at the outset of the disease process, before the temperature has become much elevated.

Otherwise, an early high febrile reaction, often exceeding 106° F., tends to be closely followed by anorexia, stiffness and pain. These symptoms give way after a day or two to an increasing dullness as the toxaemia becomes overwhelming. The temperature falls; there is coldness to the touch; the eyes become less full, and a watery diarrhoea often sets in before death, which may occur within as short a period as from 48 to 96 hours from the onset. Late cases are frequently recumbent, and have been mistaken at first glance for hypocalcaemic subjects.

In a proportion of cases, particularly where the udder is not well developed, the animal is herself successful in putting up a barrier at a comparatively late stage: a line of demarcation presently appears, and gangrenous tissue eventually sloughs away, with slow and seldom very profitable recovery.

At the first onset of the disease, a careful search of the udder and teats not infrequently reveals a scab or scar indicative of the point of entry of the infective organism some days or even weeks previously. Adjacent to this, or beneath it, may be found a small, firm, painful and often reddened area of the udder and/or teat wall. This inflammatory zone tends to spread with increasing rapidity, usually coming to involve the whole of the wall of one or more glands, together with the corresponding teats; the whole centre portion progressively changing colour, to become cold, blue and gangrenous.

Sooner or later, according to the site of the original lesion and the degree of resistance, the advancing cellulitis comes into contact with the epithelium of the gland and breaks through into the latter. Until this stage has been reached, it is unusual for microscopic examination of the milk to reveal staphylococci, although the secretion may have already changed in colour and viscosity and have yielded quite a heavy sediment.

The milk tends first to become faintly pink, with occasional clots; then straw-coloured, sticky, rather clear and greatly lessened in amount. Later, as necrosis proceeds, sometimes with the invasion of gas-producing anaerobes, the secretion assumes a vinous hue, with an increasingly offensive gangrenous odour.

This odour is quite distinct from that of the secretion in *C. pyogenes* mastitis, which is also fairly readily differentiated by its tendency to circumscribed "abscess" formation, commonly confined within the gland itself, and without the firm fixation of the *skin* of the udder to the underlying connective tissue which is the general rule with the staphylococcal cellulitis.

It has always seemed difficult to accept the logic of the contention that therapeutic agents not freely secreted into the milk are *ipso facto* unsuitable for the treatment of mastitis by the systemic route.

With some diffidence, it is suggested that the critical focus is to be found at and surrounding the capillary networks, and that it would therefore be more rational, at all events in *acute* mastitis, to endeavour to achieve bactericidal or even bacteriostatic concentrations at this point, and to try to reduce pressure, and so improve circulation, by milking out the contents of the glands, rather than to attempt the at best uncertain medication of those contents *in situ*.

It is suggested that the structure of the bovine udder has been insufficiently considered from the latter viewpoint. Personal clinical experience leads one to suspect that the use of the intra-mammary route might with advantage be confined to chronic catarrhal mastitis in the absence of undue swelling, and to the attempted "bacteriological cure" of "sub-clinical" cases, which are found to be due to highly sensitive organisms.

It seems not improbable that even in these cases the achievement of reasonably thorough medication of the gland may well be dependent perhaps less upon the presence of the therapeutic agent in the milk itself (*i.e.*, direct diffusion against gravity, aided by capillarity), than upon its absorption and re-diffusion in and around the peripheral capillary networks *outside* the lumen of the gland. Were this otherwise, it would surely be difficult to account for the high proportion of "bacteriological cures" obtained *via* the teat canal, even in the presence of considerable fibrosis within the upper parts of the gland.

Perhaps, therefore, the intra-mammary route should be reserved still further, for those agents which are found to be capable of such absorption and re-diffusion?

Again, it is well known that strains of *Staph. aureus* and *Str. dysgalactiae* (for example), commonly associated with intractable chronic catarrhal mastitis, are generally found to be penicillin-sensitive, though less so than *Str. agalactiae*. Yet unquestionably-many-times-lethal concentrations of penicillin in the foremilk usually fail to eradicate the former from the upper extremities of the gland. Perhaps in these cases the local blood-levels of penicillin are too low and too intermittent to combat successfully the less sensitive organisms ?

Commencing in the autumn of 1946, with these considerations in mind, and where economics have permitted, a gradually increasing number of early cases of the above-described acute staphylococcal mastitis have been attacked by the systemic route ; employing first the frequent subcutaneous injection of aqueous calcium and sodium penicillin ; later combined with injections of calcium penicillin in various concentrations in ol. arachis and beeswax[1] and more recently, combined with procaine penicillin in oil with aluminium stearate.

Having failed to obtain laboratory assistance for the rational assessment of dosages on the basis of bovine blood-levels, it was necessary to compute these on purely clinical grounds, and it was found that for a 9 to 10 cwt. cow an initial dose of 1 mega sodium penicillin injected subcutaneously in 5 to 10 c.c. of boiled water, together with 1½ mega Oily Penicillin B.P. injected within a muscle, the whole being repeated after 12 hours, and thereafter 1½ mega oily penicillin given alone each 12 hours, for a total period of from two to five days, was adequate to " hold " the majority of cases until (presumably) the resistance mechanism had time to build up and take over, with a high proportion of complete functional recoveries and subsequent satisfactory lactations. The apparent suitability of this dosage was later to some extent borne out by the publication in America of some blood-level estimations in the horse.[2]

More recently, 3 mega doses of procaine penicillin in oil with aluminium stearate at 24-hour intervals, reinforced by a single mega dose of the sodium salt at the outset, have proved even more effective. A further publication of blood-level estimations in America, this time in the bovine subject[3], has led to a lengthening of the interval between the final two doses of procaine penicillin to from 24 hours to 30—48 hours, depending upon the earlier response.

The publication of more work on penicillin blood-levels in domestic animals, both in health and disease, is now surely very much overdue. It would also be encouraging to learn of current research in the veterinary field in this country designed to reduce the enormous wastage of excreted penicillin which at present makes systemic therapy too expensive for use in the lower grades of commercial stock.

The above treatment is not attempted where toxaemia has already overcome the animal's resistance, with consequent *ante-mortem* fall in temperature ; nor in cases in which the amount of completed necrosis is judged to be too great to allow the owner hope of a reasonably economic return for the number of injections required. Nor can systemic penicillin therapy be expected to restore functional activity to a quarter in which the parenchyma has already become completely necrosed ; though in many such cases recovery of the animal has been sufficiently rapid to enable her to give a useful yield from the remaining three—a point of some importance, since she is generally affected at the commencement of her lactation.

It should perhaps be emphasised that both oily and procaine preparations depend for their efficiency upon the absolute dryness of the injections and the consistent siting of the latter within muscle tissue.

The recent introduction of crystalline G penicillin procaine in *aqueous* suspension[4] avoids the inconveniences of the dry syringe and the need for warming the oily preparations in cold weather; but for cattle the comparative efficacy of the new product has yet to be established.

In every case treacle is prescribed as an aid to detoxication, the animal is well bedded down, and all four quarters are stripped as frequently as practicable.

Summary

The paper is primarily concerned with acute staphylococcal mastitis in the bovine subject.

Its nature, cause, incidence, possible contributory factors and course are discussed, with remarks upon differential diagnosis in the case of *C. pyogenes* mastitis.

The manner in which intra-mammary injections reach the more distant tubules and acini and their adjacent fibrous tissue is considered, as are the limitations of therapy by this route.

It is argued that a critical factor in the treatment of mastitis is the presence of the therapeutic agent in the surrounding capillary networks, and a case is postulated for the use of systemic penicillin therapy against the more resistant of the penicillin-sensitive organisms, particularly when inflammation is acute.

Treatment of acute staphylococcal mastitis by parenteral injections of penicillin is described, and success is claimed for this method except in advanced cases.

The need for more work to be published on penicillin blood-levels in the domestic animals is emphasised, and an appeal is made for veterinary research in this country with a view to reducing the enormous wastage of penicillin by excretion, which at present makes systemic therapy too expensive for use in the lower grades of commercial stock.

Acknowledgment and References

[1] First obtained through the co-operation of Messrs. Allen and Hanbury.

[2] Doll, E. R., & Wallace, M. E. (1948.) *J. Amer. vet med. Ass.* **113.** 240-244.

[3] Morse, E. V. (1949.) *Amer. J. vet. Res.*, **10.** 314-317.

[4] ' Distaquaine ' G: The Distillers' Company (Biochemicals), Ltd.

"OUT OF THE WAY" SHEEP AT WHIPSNADE

The Zoological Society has decided (says *The Times*) that instead of keeping any of the ordinary breeds of sheep for the purpose of eating down grass in certain of the enclosures, to reduce the risk of parasitism to other stock, it would be more interesting to keep flocks of some of the out-of-the-way kinds, particularly the small, active, short-tailed sheep from the uninhabited island of Soay, which is one of the St. Kilda group. Two rams and 22 ewes (several of which are expected to lamb soon) have been obtained from the Duke of Bedford's Soay herd at Woburn, and are now at Whipsnade, where they will be shifted from paddock to paddock as wanted.

The Soay sheep is dark coffee-brown, almost black in parts, with paler chin and rump. Both sexes have horns, but the rams' horns are heavier and more sweepingly curved, while the ewes' horns are more like those of a nannygoat. They are attractive animals, more or less resembling the mouflon in general appearance.

Whipsnade has also received a ram and three ewes of another curious breed, which are a gift from the president of the society, the Duke of Devonshire. These are Jacob's sheep, also called four-horned piebald sheep, of which there are, or have been, flocks in several English parks. They are largish, shaggy, black and white animals, with the centre of the face white and the cheeks and nose black. They are one of the comparatively few breeds of sheep with four horns.

DIMIDIUM BROMIDE OR PHENANTHRIDINIUM 1553

A Note on the Present Position

BY

J. CARMICHAEL, D.SC., M.R.C.V.S., DIP. BACT.

The most important limiting factor in connection with the use of dimidium bromide in Africa has been the toxic reactions which occur from time to time. The incidence of these toxic manifestations has varied widely in different countries.

The symptoms, which generally resemble those associated with photosensitisation, were first reported by Bell in Uganda after the injection of 4 mg. per kg. of the drug and they occurred about six weeks after the injection. It is not, however, entirely clear that a true photosensitisation is the real cause of the trouble and in Nigeria similar lesions have been produced in animals kept housed and away from direct sunlight. There appears to be some dietetic factor involved and Evans in the Sudan, where some 350,000 head of cattle were treated, found that if animals were moved down to the Nile where there was adequate and fresh grazing, no symptoms occurred. Stewart in the Gold Coast also found that with better grazing this condition did not occur.

As already mentioned the results following injection of the drug vary very much from country to country, and in the Union of South Africa and the Rhodesias, where over 300,000 head have been treated, no complaints have been received. In Uganda symptoms of photosensitisation have been reported but not on a very large scale. The same applies to Kenya. In the Sudan a relatively small number showed these toxic symptoms. In Nigeria, however, a small field trial using the accepted dose of 1 mg. per kg. produced so many toxic results that the drug was never put into general use. In the Gold Coast photosensitisation has not been a serious problem.

These very varied results are extremely difficult to interpret and it was decided to test out the drug on cattle in England. Groups of two cattle were given 1 mg., 2 mg. and 4 mg. of dimidium bromide per kg. subcutaneously and were closely examined for eight weeks. There was no sign of liver damage as evidenced by the indirect Van den Berg test, nor were there any toxic lesions, with the exception of local swellings which occurred in some cases. Later two calves were given 6 mg. per kg. intravenously and, except for a slight inco-ordination of the hind legs immediately after injection in one, and collapse and rapid breathing in the other, there was no serious trouble. Within two or three minutes the calves recovered and have remained completely normal for three months, showing no signs of liver damage or other toxic symptoms. This is at least six times the therapeutic dose.

It is, of course, difficult to prove a negative finding but from these small and preliminary experiments one can only suggest that dimidium bromide in itself is very non-toxic to healthy calves in fair condition in the ordinary environment in Great Britain. These animals were kept outside but of course were not submitted to severe sunlight. It seems that there must exist in parts of Africa (possibly only at certain times of the year), especially in Nigeria in West Africa and to a certain extent Kenya and Uganda in East Africa, some factor or factors which render dimidium bromide toxic to such an extent that the therapeutic dose of 1 mg. per kg. may occasionally cause serious lesions.

(Concluded at foot of next column)

It would be extremely interesting to try to determine exactly what these factors are and whether tropical sunlight plays an essential part. Investigation into the dietetic factors is also called for. In dimidium we have a trypanocide which has been successfully used on a large scale in the treatment of animal trypanosomiasis in Africa, and it is felt that a careful and well-planned investigation into the toxicity of this drug under African conditions might produce some interesting and valuable information.

CLINICAL COMMUNICATION

STREPTOCOCCUS PNEUMONIAE INFECTION IN CALVES

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Fatal infections with *Streptococcus pneumoniae* are known to occur in animals in many parts of the world (Stitz, 1938; Kampe, 1939; Ubertini, 1939; Harms, 1942). The authors, however, can find no record of a fatal disease of calves associated with *Str. pneumoniae* in this country and the purpose of this note is to record the occurrence in Aberdeenshire of deaths in calves due to infection with this organism.

History

The present outbreak occurred amongst a group of eleven young Ayrshire calves on a dairy farm maintaining 100 Ayrshire cows and heifers.

It is the practice on this farm to remove the calf from the dam at birth. Colostrum is fed for two days followed by pail feeding twice daily with milk from the dairy herd. Solids are gradually introduced into the diet. The calf pens are light and well ventilated and there is an adequate provision of clean straw for bedding.

Within the period of a month, four of the calves, varying in age from five days to four weeks, died suddenly. In each case the calf was found dead without any signs of illness being observed.

Autopsy

Unfortunately, we were able to examine *post-mortem* only two of the four calves as our investigation did not commence until the third calf died.

A diffuse inflammation of the small intestine was present in the first calf examined. The intestine appeared to be normal in the second calf, but in this case the peritoneal cavity contained a small quantity of a brown turbid fluid. No further abnormalities were found in either calf.

Bacteriological Examination

Cultures made on blood-agar plates from heart-blood, spleen, and liver of both calves and incubated aerobically at 37° C. for 24 hours yielded *Str. pneumoniae* in pure culture.

Staining by Gram's method revealed the organism to be a Gram-positive lanceolate coccus. Short chain formations of three or four cocci were produced on artificial media; but heart blood, peritoneal fluid and spleen of inoculated

mice or guinea-pigs contained diplococcal forms in large numbers. A capsule was demonstrated by Muir's capsule staining method and also by Fleming's nigrosin method. The coccus was non-motile.

All cultures were incubated at 37° C. The best growth occurred in the presence of blood or serum. On blood agar plates at 24 hours the colonies, which had a depressed centre and slightly raised edge, measured about 1 mm. in diameter and were surrounded by a narrow zone of α-haemolysis. A diffuse turbid growth with slight deposit was apparent in serum broth at 24 hours, but in nutrient broth growth was sparse. A granular deposit formed in the latter medium when incubated for 48 hours. The organism failed to grow on McConkey's medium.

Fermentation reactions were tested over a period of 48 hours at 37° C. in peptone water containing 0·6 per cent. of each carbohydrate. Acid without gas was produced in glucose, sucrose, maltose, lactose, raffinose and inulin. Neither acid nor gas was produced in mannite, salicin, dulcite, rhamnose, xylose and arabinose. Acid and clot formed in litmus milk after 48 hours.

The pneumococcus was typed serologically, using Neufeld's reaction. Both calf strains gave a positive reaction with Type III antiserum.

Experimental Pathogenicity

Mouse.—Intraperitoneal injection of 0·5 ml. of a 24 hours old serum broth culture caused death in 24 hours. *Post-mortem* examination revealed acute peritonitis. The spleen was enlarged and congested. Gram-positive capsulated diplococci were recovered from heart-blood, spleen and peritoneal fluid, and a pure culture of *Str. pneumoniae* was obtained on blood agar plates from all three sources.

Guinea-pig.—Intraperitoneal injection of 1·0 ml. of a 24 hours old serum broth culture killed the animal in three days, with lesions and bacteriological findings similar to those encountered in the mouse.

Search for Source of Infection

The association of *Str. pneumoniae* with bovine mastitis (Roots & Karlson, 1931; Schofield & Swan, 1945; Wilson & Lancaster, 1949) suggested a possible source of infection as the calves were pail-fed with bulked milk from the dairy herd.

Milk samples were thus taken from every lactating cow in the herd and examined for the presence of *Str. pneumoniae*. The organism was not detected in any of the milk samples.

Str. pneumoniae Type III is known to occur in human throats, but as it was not possible to examine material from the workers attending the calves, the source of infection remains undetected.

Since writing this paper, an Ayrshire heifer calf, two weeks old, was received for *post-mortem* examination, and an infection with *Str. pneumoniae* Type III was demonstrated.

It appears that the calf died suddenly without previous illness but permission was not given to visit the farm from which the calf was sent and the full history of this case is not known.

The only abnormality noted on *post-mortem* examination was slight inflammation of the abomasal mucous membrane. The urinary bladder was full.

In this case, direct smears were made from liver, spleen and kidneys and stained by Gram's method. Gram positive diplococci were observed in large numbers, and were found also in heart-blood and urine.

Bacteriological examinations were carried out as described and with identical results except that raffinose was not fermented.

Sections prepared from liver, spleen and kidney, stained with haematoxylin and eosin, showed the tissue to be normal in each case. Diplococcal forms were seen in Gram-stained sections.

Pathogenicity experiments in mice were also carried out. Death occurred in five days and *Str. pneumoniae* was recovered from heart-blood, spleen and peritoneal fluid.

Summary

An account is given of the occurrence of *Str. pneumoniae* Type III in a fatal disease of young calves. In each case death was sudden, the calf being found dead without any previous signs of illness. The source of infection remains undetected.

Acknowledgments.—We wish to thank Dr. S. Jamieson for his advice and interest, and Dr. Jean Stewart of the University of Aberdeen for the supply of antisera.

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ABSTRACTS

[I. Phenothiazine for the Control of Helminthiasis in Lambs: Monthly Dosing Compared with a Phenothiazine-Salt Mixture. Pollard, E. P., Owen, R. W., & Evans, G. O. (1949.) *J. comp. Path.* **59.** 54–69.

II. The Anthelmintic Effect of Phenothiazine Administered in Small Daily Doses to Lambs Bearing Heavy Infestations of *Haemonchus contortus*. Page, K. W. (1949.) *J. comp. Path.* **59.** 70–80.]

In America an average daily consumption per head of 0·25–0·5 gramme phenothiazine in a salt mixture was found effective in depressing the worm egg count and the sheep showed significant weight gains over those on salt alone. Harbour and colleagues in South-east Scotland found that phenothiazine/salt mixture (averaging 0·25 gramme phenothiazine daily) reduced the level of clinical parasitism and the lambs generally showed significantly higher weight gains than controls. The method was not as efficient as regular monthly dosing.

Boughton & Hardy, in Texas, used one part of phenothiazine to three of salt, and later smaller proportions of phenothiazine in the mixture were used successfully in America by other workers. In Australia, with 1 : 15 and 1 : 30 phenothiazine/salt mixtures, the daily intake was less than 2 grammes per head and the method is not recommended for treating sheep under Australian conditions (Reid).

The experiments of Pollard *et al.* were planned as an extension of Harbour's work but also included groups to test

the effect of dosing ewes prior to lambing, while Page's experiments on the effect of set daily doses of phenothiazine on pure infestations were complementary to these experiments.

Pollard and his colleagues, in the present paper, record their observations on sheep treated monthly with 20 gramme doses per head of phenothiazine with access to plain salt, a group on a 1 : 10 phenothiazine/salt mixture and untreated controls with access to plain salt.

The effect of dosing ewes during pregnancy was lost before the experiments began. Worm egg counts were very considerably reduced in the monthly dosed sheep, whilst those on the medicated salt showed approximately a 50 per cent. reduction from the untreated controls. There was no evidence of effect on either *Nematodirus* or *Moniezia*.

By the end of the summer, when the experiments ended, the control groups contained 30 per cent. of lambs with infestations of clinical significance (*i.e.*, egg counts of 500 per gramme or more), the monthly dosed group contained none at this level and had been almost completely free from the second month. The medicated salt group of lambs had approximately 10 per cent. infestations of clinical significance for four months but there were none at the end of the experiment.

In the last two months of the experiment pasture infestation with infective larvae was very much lower in the pens of both treated groups than in that of the controls.

When worm counts were made at *post-mortem* examinations in September and October, there was less reduction in worms than the egg counts might have indicated, though both treated groups bore less worms than the controls.

There was relatively little effect at the dosages used on *Ostertagia*, and a reduction of about 50% in the *Trichostrongylus* count of the treated salt group, and approximately 60 per cent. in the monthly dosed group, as compared with untreated controls. The differences in the counts of the other spp. of worms are too slight to be significant.

The percentage weight increases favoured the monthly dosed groups, particularly at the end of the experiment, and this group had a better dressing percentage than the other two groups.

In discussing the results the authors point out that results could hardly be expected to be striking as the untreated controls carried only low infestations. They consider that unless the animals suffer from a definite salt deficiency it is unlikely they will ingest with regularity an adequate amount of the medicated salt. Best results have been obtained with this method in arid regions of the U.S.A. where salt licks have to be provided. In the present experiment the daily intake of phenothiazine was less than 0·2 gramme per head which is less than necessary. [It would be of great interest to have information on what would have followed the use of a higher dosage regime, *e.g.*, 30–40 grammes with a reduced number of doses.]

Page used lambs artificially infested with *Haemonchus* and compared the effect of daily doses of 0·25 and 0·5 gramme phenothiazine from 14 days before to 70 days after infection and from the 42nd to 70th days after infection. Undosed, infected and uninfected sheep were kept as controls.

The effect on faecal egg counts of 0·25 gramme (in both groups) was quite distinct but not nearly so distinct as with 0·5 gramme daily. On the latter dosage there was almost complete suppression of the egg count in the group dosed from 14 days before to 70 days after infection and a most marked reduction (97 per cent.) with treatment from the 42nd to 70th days after infection.

The worm counts at *post-mortem* examination were similarly affected, the best results occurring in the sheep in which treatment started before infection; at the higher dosage on this regime only eleven worms were found in the two lambs as compared with 3,000 in the untreated. The pre-infection treatment with 0·25 gramme daily appeared better than the post-infection treatment with 0·5 gramme.

It is concluded that 0·25 gramme daily was inadequate to reduce clinical parasitism but 0·5 gramme had a marked anthelmintic effect.

It was not established that egg laying was inhibited by small daily doses, reduced egg counts being attributed to reduction in female worms.

J. S. S.

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[**I. Q Fever in Great Britain. Isolation of *Rickettsia burneti* from an Indigenous Case.** MacCallum, F. O., Marmion, B. P., & Stoker, M. G. P. (1949.) *Lancet*. **11**. 1026–1027. (10 refs.)

II. Q Fever in Great Britain. Clinical Account of Eight Cases. Harman, J. B. (1949.) *Lancet*. **11**. 1028–1030. (9 refs.).]

I.—Q fever, first described in Australia in humans (1937), was shown to be caused by *Rickettsia* (*Coxiella*) *burneti*, this agent being isolated from ticks in the U.S.A. the following year. Since then Q fever has been identified in many countries of Europe and Asia Minor. Outbreaks are usually observed in persons having some contact with cattle, although not necessarily direct. The epidemiology, differing somewhat from country to country, supports the hypothesis that man is commonly infected by inhaling dust contaminated by tick excreta or animal secretions. A good proportion of bovine sera from infected regions fix complement in the presence of *R. burneti* antigen, the agent itself commonly being found in their milk. In California, occupational exposure to sheep and goats has also been incriminated as a source of infection. In Britain four cases had been recognised serologically by 1948. The authors describe laboratory isolation of the agent from one of another eight British cases diagnosed by complement fixation. This was done by inoculating guinea-pigs with blood and sacrificing at febrile phase. Guinea-pig tissue extract was used to infect the yolk sacs of fertile eggs which were harvested after five days' incubation and passed again in eggs. Latter eggs were dead on fourth day, yolk sacs from them containing Rickettsia-like organisms and producing complement fixing antibodies when injected into guinea-pigs. This strain and others isolated from milk are being compared with American and Italian strains.

II.—Diagnosis and clinical account of the eight cases mentioned in the previous abstract. Cases (1–4) arose by nursing and *post-mortem* examination of atypical pneumonia case (5) in hospital. Diagnosis was confirmed by isolation of agent (1) and serologically (1–4). Case (5) was confirmed by discovery that serum of patient's wife (case 6) fixed complement although she had not visited the hospital. Cases (7–8), husband and wife, were infected from independent source. Clinically, disease starts with sudden fever (temperature fluctuating rapidly), prostration, muscular pains and severe headache. Within a week an unproductive cough begins and ill-defined signs of chest involvement which are more marked radiologically. Gastro-intestinal symptoms, skin rash and coryza are absent. Usually severe symptoms subside in a week but lassitude may persist for months. Mortality in clinical cases is about 1 : 500, fatalities occurring mainly in older people. Published results indicate that treatment with aureomycin may be effective; sulphonamides, penicillin and probably streptomycin are ineffective. Results of cases treated with chloramphenicol have not yet appeared.

A. W. G.

PHARMACEUTICAL SOCIETY: VETERINARY CODEX COMMITTEE

FIRST MEETING

In our issue of last week we intimated the appointment by the President of the Pharmaceutical Society of Great Britain, with the authority of the Council of the Society, of the personnel of the Veterinary Codex Committee, seven of the 12 members being members of the veterinary profession.

The committee held its first meeting at the offices of the Pharmaceutical Society, on Tuesday, April 18th, when Dr. R. F. Montgomerie, F.R.C.V.S. (Vice-Chairman) presided in the absence of the Chairman, Mr. C. W. Mablethorp, Ph.C., F.R.C., who is in America.

The meeting was preceded by a luncheon at the Holborn Restaurant, W.C.2, at which, again in the absence of Mr. Mablethorp, the President of the Pharmaceutical Society, Mr. H. Clement Shaw, welcomed the members of the Committee, response being made by Dr. Montgomerie.

The photograph reproduced herewith was taken prior to the first meeting. As noted above, the Chairman, Mr. C. W. Mablethorp, was absent unavoidably; asterisks indicate members of the Committee.

Photo: Topical Press.

Seated (L. to R.).—Dr. R. F. Montgomerie, F.R.C.V.S.* (Past-President, N.V.M.A., in the chair); Mr. H. Clement Shaw, M.P.S. (President, Pharmaceutical Society of Great Britain); Professor Thos. Dalling, M.A., M.R.C.V.S.* (Chief Veterinary Officer); Mr. G. H. Hall, M.P.S.*; Dr. H. G. Lamont, M.R.C.V.S.*; Dr. F. J. Dyer, Ph.C., A.R.I.C.*; Mr. J. W. Bruford, M.R.C.V.S.* (President, N.V.M.A.) and Mr. J. P. Byron, M.P.S., A.R.I.C.* *Standing* (L. to R.).—Dr. K. R. Capper (Editor, *British Pharmaceutical Codex*), Mr. R. G. Todd, M.P.S. (Secretary to the Committee); Dr. J. Carmichael, M.R.C.V.S.*; Mr. L. Guy Anderson, D.V.M., M.R.C.V.S.*; Mr. Neal-Morris, M.R.C.V.S., M.P.S.*; Mr. F. Knight (General Secretary, N.V.M.A.); Mr. F. W. Adams, Ph.C., A.R.I.C. (Secretary and Registrar, Pharmaceutical Society of Great Britain), and Mr. W. K. Fitch, M.P.S. (Publications Manager, Pharmaceutical Society).

FIRST WOMAN FELLOW OF THE R.C.V.S.

At the Quarterly Meeting of Council of the Royal College of Veterinary Surgeons held on Friday, April 21st, 1950, it was announced, amid great applause, that the Fellowship of the Royal College of Veterinary Surgeons had been awarded to Miss Joan Olive Joshua, in respect of a Thesis entitled "Some Clinical Observations on Leptospirosis in Suburban Dogs."

Miss J. O. JOSHUA, F.R.C.V.S.

The above notification of the award to Miss Joshua of the R.C.V.S. Fellowship Diploma acquires historic significance through the fact that the exacting test of professional scholarship and proficiency represented by the examination has been passed by a woman graduate for the first time in the annals of the Royal College.

Miss Joshua obtained the Diploma of M.R.C.V.S. in July, 1938, having been a student at the Royal Veterinary College and Hospital of London. She obtained second class honours in the first and fourth examinations for the Diploma, as well as gaining credits in Physiology and Histology, and in Pharmacology and Animal Husbandry, Part 2.

Since the first woman veterinary surgeon, Miss Aileen Cust, was admitted to the profession as a London graduate in 1922, there has been a steady influx of women members, a number of whom are making their mark in the fields of practice, research and veterinary public health. In the first of these Miss Joshua has been outstanding since, following her occupancy, after graduation, of the post of House Surgeon in the Beaumont Animal Hospital, she entered into practice on her own account at Church End, Finchley. To her abilities and felicity of expression high tribute was paid by her selection as a contributor to the proceedings of last year's Congress of the N.V.M.A., when in masterly fashion she reviewed the clinical aspects of leptospirosis.

To these qualities as a practitioner Miss Joshua adds a strong sense of responsibility that no effort should be spared to place her abilities and her time, at considerable sacrifice, at the service of her profession in the promotion of its corporate interests. To this end, she has devoted herself whole-heartedly for a number of years to the work of the Editorial Committee of the N.V.M.A., whose members having appointed her their chairman in the year 1948-49, at its close renewed the appointment in acknowledgment of her supreme fitness for that exacting office. On similar grounds, an honour unique in the long history of that body was conferred upon her by the Central Veterinary Society, over whose proceedings, also, Miss Joshua now rules as President. We may be sure, however, that the recognition of her worth accorded by that historically eminent society has but enhanced her appreciation of the action of the Society of Women Veterinary Surgeons, of which she is a Founder Member, in electing her to its Presidency at its inaugural meeting in 1941. It is, in fact, to that organisation that Miss Joshua owes her introduction to what has come to be known as the political life of the profession, in which sphere, too, she has played an effective part, notably as a member of Council, N.V.M.A.

It is, therefore, with a wealth of approbation forthcoming from many spheres of veterinary work and thought, that the bestowal of this first Fellowship in the feminine field will be acclaimed—and by none more sincerely than by her colleagues in the ranks of our professional women, to whom once again Miss Joshua has brought distinction and, may we add, set an equally high example.

REVIEWS

[Mammals in Britain. MICHAEL BLACKMORE. (1948.) Pp. 128, with 77 illustrations. Collins, 14, St. James's Place, London, S.W.1. 15s. net.]

This book is probably most notable for the excellence of the photographs which illustrate it profusely. The subject matter is confined to a description of the wild mammals indigenous to this country. In places the text presents a curious contrast between presentation of the more ordinary naturalist's observation of his subjects and a fairly technical consideration of some little understood embryological details in certain instances. The book would, however, make a worth-while addition to anyone's library.

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[Kind Killing. U.F.A.W. Handbook. (1950.) Compiled by F. JEAN VINTER, Technical Secretary. Published by the Universities Federation for Animal Welfare, 284, Regent's Park Road, Finchley, N.W.3. Price 3d.]

The author has attempted in a brief review of some of the accepted methods of euthanasia to give guidance to persons who may be called upon to destroy living creatures.

It is of interest to note that the killing of lobsters is best accomplished by slowly increasing the temperature of the water.

Perhaps too much emphasis appears to be given to the use of lethal chambers for dogs and cats, and destruction by crushing as recommended for some of the smaller creatures (slugs, snails, etc.) in small numbers will, by contrast, have a more painful effect on persons carrying out the act.

The information in the pamphlet, however, should do much to ensure a speedy death and so lessen the suffering of many creatures and at the modest price of 3d. it should be possible to obtain wide distribution.

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Also received: HARD PAD DISEASE (PARA-DISTEMPER), by Dr. J. M. Young. Price 2s. 6d. Copies obtainable from the author at Cona Lym Cairn Kennels, Percy Gardens, Tynemouth.

Animal Health Trust Publications*:

Night Blindness in Dogs: Progress Report No. 2, March, 1950. Price 1s. 6d.

Guides to Animal Health: No. 1, Coccidiosis in Poultry; No. 2, The Fowl Paralysis Complex. Price 6d.

* 232/5, Abbey House, Victoria Street, London, S.W.1.

QUESTIONS IN PARLIAMENT

Horses (Export and Slaughter)

Mr. Sutcliffe (April 20th) asked the Minister of Health whether he has yet given consideration to recommendations (*f*) to (*n*) and (*r*) of the Departmental Committee on the Export and Slaughter of Horses: and, if so, whether he will give an indication of the action it is proposed to take.

Mr. Bevan: These recommendations are still under consideration. I am afraid I am not yet ready to make any statement.

Mr. Sutcliffe: Could the Minister say when he will be able to make a statement?

Mr. Bevan: Discussions are taking place between my Department and the Ministry of Food about the transfer of legal responsibility for this subject, and I hope that a statement will be made next week.

Lieut.-Colonel Sir Thomas Moore (April 20th) asked the Minister of Agriculture when he proposes to give effect to his recommendations of Lord Rosebery's Committee on the Export and Slaughter of Horses.

Mr. T. Williams: I would refer the hon. and gallant Member to the full statement I made in the reply to the hon. Member for Banbury (Mr. Dodds-Parker) on March 30th. [*Vet. Rec.* **62.** 215.]

Sir T. Moore: Yes, but as the right hon. Gentleman will realise, the public have the fate of these exported horses very much at heart. Will he do something, in conjunction with the Minister of Health, to expedite action in regard to this matter?

Mr. Williams: The hon. and gallant Gentleman has been informed before, I think, that from the date when the Committee was set up no horses were exported, so there cannot have been any anxiety.

Sir T. Moore: Yes, they can be exported.

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Horse Breeding

Mr. Sutcliffe (April 20th) asked the Minister of Agriculture what steps he proposes to take to encourage the breeding of horses in this country without encouraging such breeding for purposes of slaughter.

Mr. T. Williams: Grants are available to heavy horse societies to encourage the breeding of horses. In addition, my Department, in co-operation with the British Horse Society, is preparing a film which, I hope, will stimulate interest in horse breaking and management. More emphasis is also being given to demonstrations in management at local and national agricultural shows.

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Calves (Earmarking)

Mr. Braine (April 20th) asked the Minister of Agriculture if he will take steps to stop the present method of earmarking calves under the subsidy scheme, and adopt some other method of identification which avoids the unnecessary injuries now caused.

Mr. T. Williams: No, Sir. The present method of marking was adopted after a careful study of humanitarian considerations and practical requirements, and I see no reason to change it.

Mr. Braine: Is the Minister aware that many farmers are perturbed at the way in which the hole is punched in the ear? It catches in trees, and so on, half tearing the ear off, spoiling the appearance of the animal, and causing unnecessary suffering.

Mr. Williams: I have had no information brought to my notice to that effect, but the hon. Member will be aware that this ear punching was to avoid the same calf's collecting two sets of subsidies.

Mr. Oliver Stanley: Would that have been very painful to the calf?

Mr. Hopkinson: Is the Minister aware of the importance which breed societies attach to this question, and to the fact that the problem can be quite easily solved by tattooing the left ear, as is done in the case of bulls?

Mr. Williams: I can assure the hon. Gentleman that the National Farmers' Union was consulted before this method was approved.

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West Africa: Parasitic Disease (Treatment of Animals)

Mr. Thomas Reid (April 19th) asked the Secretary of State for the Colonies, in view of the wide prevalence of trypanosomiasis in West Africa, what reports he has received of the treatment of this disease by the use of antrycide.

The Under-Secretary of State for the Colonies (Mr. Cook): My right hon. Friend's Tsetse Fly and Trypanosomiasis Committee has recently been considering reports from many parts of Africa, including West Africa, concerning experiments in the use of antrycide in cases of animal trypanosomiasis. These reports tend to confirm the curative merits of the drug, but, owing to the danger of toxicity and drug resistance, my right hon. Friend's expert advisers are agreed that further experimental work is required into its prophylactic qualities. This work will be pursued.

Mr. Oliver Stanley: May I congratulate the hon. Gentleman on cutting his way so successfully through that verbal jungle?

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Hides and Skins (Marketing)

Mr. Odey (April 19th) asked the Minister of Food whether he will undertake to arrange for full consultation with the tanning industry and other interested parties before he decides to take over from the Hide and Allied Trades Improvement Society and corresponding organisations in Scotland any of their functions as neutral bodies in the marketing of domestic hides and calfskins.

Mr. Webb: Yes, Sir. Consultations with the industry and other interested parties have been going on since November last, and a meeting with the Hide and Allied Trades Improvement Society is being held to-day.

Mr. Odey: Is it the Minister's intention to set up a State monopoly in the sale of hides and skins? If so, will he see that the functions of the Hide and Allied Trades Improvement Society are retained as protecting the consumers' interest?

Mr. Webb: I think we had better wait the outcome of to-day's meeting.

Mr. Vane: Can the right hon. Gentleman tell us the connection between food and skins and hides?

Mr. Messer: We cannot get the food without removing the overcoat.

Weekly Wisdom

"To the solid ground
Of nature trusts the Mind that builds for aye."
William Wordsworth. ("Miscell. Sonnets," Pt. 1.)

NOTES AND NEWS

Diary of Events

May 3rd.—Meeting of the Lancashire Division, N.V.M.A., at Manchester (Grand Hotel, Aytoun Street), 2.30 p.m.

May 4th.—Meeting of the West of Scotland Division, N.V.M.A., Clinical Club, in the Glasgow Veterinary School, 7.30 p.m.

May 4th.—Annual Meeting of the Central Division, N.V.M.A., at the Royal Veterinary College, N.W.1, 2 p.m.

May 6th.—Annual Meeting of the Association of Veterinary Officers, at the Royal Veterinary College, N.W.1, 2 p.m. Annual Dinner, 6 p.m.

May 11th.—Meeting of the East Midlands Division, N.V.M.A., at Sutton Bonington, 2.15 p.m.

May 17th.—Spring Meeting of the Eastern Counties Division, N.V.M.A., at Colchester (Red Lion Hotel), 2.15 p.m.

May 18th.—Annual Meeting of the Society of Veterinary Practitioners, in the Holborn Restaurant, London, W.C.1, 2.30 p.m.

May 24th.—Meetings of the Editorial Committee, N.V.M.A.: Executive, 1.30 p.m.; Main, 3 p.m.

May 25th.—Special Meeting of the South-Eastern Division, N.V.M.A., at Maidstone (Royal Star Hotel), 6.30 p.m.

R.C.V.S. Examinations

May 4th.—R.C.V.S. Animal Management Examinations commence at Dublin.

May 9th.—R.C.V.S. Entries for D.V.S.M. Examinations due.

May 15th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syllabus): Written Examination.

May 17th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syllabus): Orals and Practicals (London and Dublin).

June 8th.—R.C.V.S. D.V.S.M. Written Examination commences, at Edinburgh.

June 22nd.—R.C.V.S. Membership Written Examination.

"Doping" in Greyhounds

The Technical Development Committee of the N.V.M.A. has under consideration an article on malpractices and methods of "doping" in greyhounds. Any veterinary surgeon who can contribute to the information required is asked to write to the General Secretary, N.V.M.A., 36, Gordon Square, W.C.1, giving full details. In particular, the following information is desired:—

1. What methods are used which affect running, including drugs used and their effect?

2. Where drugs are used, is there any information available regarding the average amount of time lost over a given distance with particular reference to (*a*) the effect of varying dosage and (*b*) administration at varying periods prior to racing?

3. What are the clinical symptoms manifested, if any, when drugs are used, and what is the routine adopted to permit clinical detection or suspicion of "doping"?

4. Give information on methods of administration of drugs used.

5. What specimens are forwarded to the laboratory for analysis to confirm or refute a suspicion of "doping," including method and time of collection?

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PERSONAL

Dr. J. R. M. Innes, M.R.C.V.S., holder of a special research fellowship awarded by the U.S.A. Public Health Services Division of Mental Science, has been elected to the Academy of Medicine, Washington, D.C.

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R.C.V.S. OBITUARY

Green, Alfred Ronald. Graduated London, December 17th, 1937. Died in Tanganyika, April 9th, 1950; aged 47 years.

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Knowles, John Darnall, Capt., late R.A.V.C., Roughwood, Thornbury, Bradford. Graduated N. Edinburgh December 21st, 1896. Died April 13th, 1950; aged 74 years.

Mr. Knowles had been in practice in the Bradford area for over 40 years, including service as veterinary surgeon to Leeds Greyhound Stadium for 16 years. During the 1914-18 war he served as a Captain with the Royal Army Veterinary Corps.

A keen golfer, he was a former captain of Bradford Golf Club.

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Whitworth, Stanley Howarth, dr. med. vet. (zür.), b.v.sc. (melb.), Capt. late A.A.V.C. Graduated London, December 11th, 1919. Died at 35, Weymouth Street, London, April 21st, 1950; aged 49 years. Since his retirement from the post of Chief Veterinary Officer, Malaya, Dr. Whitworth had held the post of Veterinary Officer, Office of the High Commissioner for Canada.

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LEGAL NOTES

"*Cattle in Various Stages of Malnutrition.*"—For causing unnecessary suffering to his 34 head of cattle, said by a veterinary surgeon to have been in various stages of malnutrition, Major Reginald Page, of Springham Farm, Hellingly, was fined £10 with £22 costs by Hailsham Magistrates (reports the *Southern Weekly News*). He was told by the chairman: "In our opinion your method of farming must be a very bad one and we are shocked that someone in your position should keep animals in the condition we are told you kept them in."

For the prosecution, conducted for the R.S.P.C.A. by Mr. Gordon Jones, it was stated that seven calves and two cows kept in one field and seven heifers in another were found by police and R.S.P.C.A. Inspector Edward Winn, of Eastbourne, to be "in a very poor condition."

Mr. William Murdoch, veterinary surgeon, said some of the cattle had apparently eaten tree bark. The grazing was too short for the animals to eat.

Major Page, represented by Mr. S. L. Clarke, said the young calves and heifers had some 40 to 50 acres of grazing and he considered it adequate. It was his practice to leave his animals out in this way because he found that eventually they were more hardy and healthy than artificially fed cattle.

It was stated that after being fed by the inspector the animals showed marked signs of improvement the next day. Page had sold some of the stock to a neighbouring farmer on the inspector's suggestion.

ROYAL COLLEGE OF VETERINARY SURGEONS

Central Library for Animal Diseases

Accessions for the Quarter Ending March, 1950

Presentations

Books

Brunini, Joao: Manual veterinario dos caes, Jaboticabal (Brasil) Uzinas Chimicas Brasileiras, 1950. Presented by the author.

Great Britain, Admiralty. Committee on humane slaughtering of animals. Minutes of evidence taken before the committee appointed by the Admiralty to consider the humane slaughtering of animals. London, H.M.S.O., 1904 (Photostat). Presented by Sir Charles Hardinge.

Groos, Karl: Die Spiele der Thiere. Jena, Fischer, 1896. Presented by the Royal College of Surgeons.

Harms, Carsten: Erfahrungen uber Rinderkrankheiten und deren Behandlung, etc. Berlin, Enslin, 1890. Presented by the Royal College of Surgeons.

Lipnicki, Janusz: Organizacja walki z gruzlica i bruceloza bydla w polsce. Warsza a, Lekarski Institut Naukowo-Wydawniczy, 1949. Presented by the Glowna Biblioteka Lekarska, Warszawa.

Minett, Francis Colin (Editor): Outline of veterinary science. Karachi, Manager of Publications, 1949. Presented by Dr. F. C. Minett, M.R.C.V.S.

Pusch, G.: Lehrbuch der allgemeinen tierzucht. Stuttgart, Enkem, 1904. Presented by the Royal College of Surgeons.

Sticker, Anton: Ueber den Krebs der Thiere, etc. Berlin, Hirschwald, 1902. Presented by the Royal College of Surgeons.

Visnyakow, A. I.: Veterinarnaja rentgenologija. Mockba, 1940. Presented by the Glowna Biblioteka Lekarska, Warszawa.

Volferts, V. Yu: Veterinaro-sanitarnaja ekspertiza, etc. Mockba, 1938. Presented by the Glowna Biblioteka Lekarska, Warszawa.

Reports, 15; *Pamphlets and Reprints*, 56.

Purchases

Aslib: Aslib guides to sources of information in Great Britain. No. 2: Agriculture and allied interests. London, Aslib, 1949, 13s.

Breul, Karl (Compiler): Cassell's German and English dictionary, 8th ed. London, Cassell, 1949, 17s. 6d.

Brown, James Duff: Manual of library economy, 6th ed., revised by W. C. Berwick Sayers. London, Grafton, 1949, 35s.

Craplet, C.: Les maladies du mouton et de la chevre. Paris, Vigot Freres, 1950, 10s.

Fleming, Sir Alexander (Editor): Penicillin, its practical application, 2nd ed. London, Butterworth, 1950, 30s.

Fraser, Allan: Sheep husbandry. London, Crosby Lockwood, 1949, 25s.

Hagedoorn, A. L.: Animal breeding, 3rd ed. London, Crosby Lockwood, 1948, 15s.

Henning, M. W.: Animal diseases in South Africa, 2nd ed. South Africa, Central News Agency, 1949, £3 5s.

Hughes, A. M.: The mites associated with stored food products. London, H.M.S.O., 1948, 3s.

Mansion, J. E. (Editor): Harrap's standard French and English dictionary, two vols. London, Harrap, 1947-48, £5 11s.

Markowitz, J.: Experimental surgery, 2nd ed. Baltimore, Williams Wilkins, 1949, 56s.

Moon, G. R.: How to become a doctor. Philadelphia, Blakiston Co., 1949, 16s.

Mulligan, R. M.: Neoplasms of the dog. Baltimore, Williams Wilkins, 1949, 31s. 6d.

Russell, F. C.: Diet in relation to reproduction and viability of the young. Part 1: Rats and other laboratory animals. Aberdeen Commonwealth Bureau of Animal Nutrition, 1948, 6s.

Thomas, J. F. H.: Sheep. London, Faber & Faber, 1945, 15s.

Titus, Harry W.: The scientific feeding of chickens, 2nd ed. Danville, Interstate Publishing Co., 1949, 21s.

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ADVERTISEMENTS FOR DOCTORS

The *British Medical Journal* has decided not to accept advertisements for vacancies in the medical Civil Service until the present deadlock over the salaries of Civil Service doctors is broken. The decision was made after a letter from the Chancellor of the Exchequer stating that the doctors' claim must be treated as a Civil Service claim and dealt with on the basis of that policy.

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RINDERPEST OUTBREAK IN TANGANYIKA

Isolated Area Affected

The Northern and Southern Rhodesian, Nyasaland and South African Governments are, states the Dar-es-Salaam Correspondent of *The Times*, being informed of developments in the outbreak of rinderpest among cattle in the isolated area of the Njombe

district, in the Southern Highlands Province, 200 miles from the nearest point where rinderpest was last established among cattle in the Central Province. This apparent jump across bush and desolate country is unprecedented, and a veterinary specialist has been sent to the area to make investigations, while veterinary officers from other parts of Tanganyika have been sent to make inoculations.

Any sign of the spread of rinderpest south of the Central Railway has always created concern among the countries to the south, but it is emphasised that the position is not yet one to cause alarm. The last serious outbreak of rinderpest in East Africa was early in the war. One difficulty is the suspicion among Africans of any form of inoculation.

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BRITISH HORSE SOCIETY

The following items are extracted from the report of the meeting of the Council of the Society (held on February 9th), appearing in the current issue of *The Horse and Pony News*:—

Transport of Horses by Rail.—It was reported that various letters had been received since the last meeting when Mr. J. O'Connell, M.R.C.V.S., who represented the British Railways on the Council, had asked that any complaints should be submitted to him. It was agreed to place the correspondence in his hands.

Olympic Games.—It was decided that the Executive Officers should consider the question of appointing a special committee to be responsible solely for the preparations necessary to ensure Britain's representation in the equestrian events of the 1952 Olympic Games. A report was to be submitted at the next meeting.

Dressage Committee.—It was reported that the Novice Test was now being printed and that it had been agreed that the "B" Test should be the one now used at Badminton (Three Days' Event).

It had been decided that in the B.H.S. Championship horses would not be allowed to take part in more than one test, and it is recommended that the same rule should be adopted by other shows holding Dressage tests.

A panel of Dressage judges had been compiled and would be available shortly. The standard text book "Notes on Dressage" had been issued; price 1s. 6d. per copy.

A register of animals taking part in Dressage Classes had been opened. All those who had had horses placed in Dressage Classes since January 1st had been invited to send in details of their horses and the awards gained. The shows having such classes had already sent in marked catalogues, so that the register was now being prepared.

It had been agreed that shows advertising classes under B.H.S. Dressage rules be asked to submit draft schedules and names of judges, to supply marked catalogues after the show and to agree that the test offered should be either a B.H.S. Test or a test approved by the Committee.

Heavy Horse Sub-Committee.—The Chairman, Mr. W. J. Cumber, reported that the British Horse Society had been responsible for the organisation of several meetings, at which officials of the four heavy horse breed Societies had met representatives of the Ministry of Agriculture and the Department for Scotland.

The attendance at meetings had been nearly 100 per cent. and the Committee appreciated the fact that the representatives of the Clydesdale Horse Society had made so many long journeys in order to be present. The Committee would like to thank the President—Major J. G. Morrison—for the keen interest he had taken in their activities and to express their thanks to the Race-course Betting Control Board for the generous grant they had made.

The present position of the heavy horse industry had been very thoroughly discussed and, as a result, many ideas and suggestions, both from the Ministry of Agriculture and from the Societies, are now being considered in detail. The opportunity afforded of enjoying frank and confidential discussions on many subjects is appreciated by the Societies and the Ministry's officials.

A circular on the subject of hiring motor transport for the conveyance of stallions is to be issued to heavy horse hiring societies and methods of allocating grants, with a view to avoiding overlapping, have been discussed. A film on heavy horses, showing their breeding, breaking, training and use, is in course of preparation and a demonstration for young farmers will be staged at the Royal show at Oxford. Efforts will be made to induce other shows to hold similar competitions.

So far, the meetings have consisted mainly of a full exchange of ideas and views, but the Committee hope that they will soon be able to report practical means of maintaining and encouraging the use of heavy horses in agriculture and commerce.

***Festival of Britain.*—The Society has been invited to participate in the Festival, and accordingly Major J. G. Morrison and Major J. L. Walters were invited to act as Chairman and Vice-Chairman** of a Committee to deal with the various ideas and suggestions submitted.

Rights of Way.—The Council accepted an invitation to nominate a representative to attend meetings of the Joint Sub-Committee of the Commons Preservation Society and the Ramblers' Association. This Committee is considering the National Parks and Access to the Countryside Act, 1949, and is particularly interested in the forthcoming Survey of all public footpaths and bridleways.

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National Institute for Medical Research

Royal Inauguration of New Centre

In the course of a contribution to the issue of *The Times* of April 21st, a special correspondent states that the King and Queen will visit Mill Hill on May 5th to inaugurate the new National Institute for Medical Research, "a building which is one of the most remarkable to be completed in this country since the war, and which is said to embody standards of design, construction and equipment unrivalled in any building of its kind."

The building occupies part only of the estate at Ridgeway, Mill Hill, parts of which are already occupied by the farm laboratories and other buildings of the Medical Research Council. It is of brick construction, with copper roof, and takes the form of a central block of seven storeys, with two wings at each end, set obliquely and having three storeys from ground level at the front, though, because of the fall of the ground, certain parts have also well illuminated basement and sub-basement rooms. The working space is about 90,000 sq. ft., without the stores and the Fletcher Memorial Hall above them, which will serve as a lecture room and in which the inaugural ceremony will take place. Including outlying buildings, some of which are under construction, the institute will house ultimately about 100 qualified scientific workers, with assistant, maintenance and administrative staff numbering between 250 and 300. The staff at present numbers 335.

There are laboratories on each floor up to the third, and a library, canteen and club rooms above. The largest allocation of space has been made to the division of chemotherapy, because it was the expansion of this work which mainly necessitated the new institute. The ground floor has organic chemical laboratories, and below are rooms for such purposes as micro-analysis, hydrogenations and large-scale operations. The biological section is on the first floor, where experimental work on the diseases of greatest current interest in chemotherapy and the testing of new compounds produced by chemists will be done. For certain tropical diseases an insectarium is required, and this cannot conveniently be incorporated in the main building, but is being erected near it. The division of chemotherapy is now studying such tropical diseases as filariasis, amoebic dysentery and malaria, and is giving special attention, among bacterial diseases, to tuberculosis.

Virus research has long been a major interest in the institute, and the work goes on in several laboratories. It is from here, for instance, that the research on the common cold at the Harvard Hospital, Salisbury, is directed. The division pays much attention to such virus diseases of the respiratory system as influenza. In fact, the division includes the world influenza centre administered by the Medical Research Council for the World Health Organisation.

The research work of the department of biological standards is on problems of bacteriology and immunology, and the international standards themselves are stored in a cold room in the north-east wing. In the division of experimental biology the chief lines of research now being pursued are on problems of fertility and on obesity. The former is being studied particularly from the point of view of factors affecting the viability and survival of spermatozoa, and the work, apart from its scientific interest, has direct bearing on artificial insemination. The head of this division is responsible for the experimental animal house in the main building, and for the small animal breeding colony outside.

Provision has had to be made for a division of bacterial chemistry, with the object of studying all factors affecting the growth and metabolism of bacteria. There is also full equipment for general physiological and pharmacological work, with specialised accommodation for electro-physiological research which has occupied a prominent part in the institute's programme.

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***"Hepatitis Contagiosa Canis": Forthcoming "Central" Discussion.*—It is hoped that there will be a particularly good attendance of Fellows and visitors at the Annual General Meeting of the Central Veterinary Society on May 4th, when, as intimated in our Notices column, interest will centre upon the discussion of *"Hepatitis contagiosa canis"* (Rubarth's disease). The discussion of this specific disease of dogs, which is of considerable clinical importance, will be opened by Mr. T. W. F. Pay and Dr. R. F. Montgomerie.**